

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
27 December 2002 (27.12.2002)

PCT

(10) International Publication Number  
**WO 2002/102320 A3**

(51) International Patent Classification<sup>7</sup>: C12N 15/00 (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/US2002/019448

(22) International Filing Date: 14 June 2002 (14.06.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/298,710 15 June 2001 (15.06.2001) US

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(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
26 August 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2002/102320 A3

(54) Title: FCE FUSION PROTEINS FOR TREATMENT OF ALLERGY AND ASTHMA

(57) Abstract: The present invention includes Fc $\epsilon$  fragments conjugated with FC $\gamma$  fragments, for example, Fc $\epsilon$ 1-Hinge-FcE2-FcE3-FcE4-FC $\gamma$ ; Hinge-FcE2-FcE3-FcE4- Fc $\gamma$ ; FC $\epsilon$ 2-FcE3-FcE4-FC $\gamma$ ; FC $\epsilon$ 2-FcE3- Fc $\gamma$ ; FC $\epsilon$ 3-Fc $\gamma$ ; and FC $\epsilon$ 3-FcE4-FC $\gamma$ , or any derivative or peptide, which has equivalent immunological function. The Fc $\gamma$  fragment may be a fragment of any of the IgG subclasses (IgG1 I IgG2, IgG3, or IgG4), preferably IgG1 or IgG3, wherein the fragment binds Fc $\gamma$ RIIB. The present invention also includes compositions suitable for administering to a patient suffering from an allergic disease comprising the fusion protein construct in a pharmaceutical composition including, for example, an excipient, diluent, or carrier. This treatment may be combined with anti-IgE therapy or allergen immunotherapy.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US02/19448

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : C12N 15/00  
US CL : 424/192.1, 193.1; 530/862

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 424/192.1, 193.1; 530/862

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Medline, Biosis, Scisearch, caplus, embase on STN

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	NISSIM et al. Mapping of the High Affinity for Fcepsilon Receptor Binding Site to the Third Region Domain of IgE, February 1990, Vol 10. No. 1, pages 101-107, especially page 102.	2-6
Y	BASU et al. Purification and Characterization of Human Recombinant IgE-Fc Fragments That Binds to the Human High Affinity IgE Receptor. J. Biol. Chem. 25 June 1993, Vol 268. No. 18, pages 13118-13127, especially page 13121, Fig 1.	2-6
Y	WO 99/62550 A1 (CAPLAN et al) 09 December 1999 (09.12.1999), page 4, lines 5-6, page 3, lines 10-13 and 24-32, page 19, line 20-21.	1-6
Y	US 5,116,964 A (CAPON et al) 26 May 1992 (26.05.1992), column 5, lines 61-65, column 8, lines 32-36, column 10, lines 10-15.	1-6
Y	ARGOS et al. An Investigation of Oligopeptides Linking Domains in Protein Tertiary Structures and Possible Candidates for General Gene Fusion. J. Mol. Biol. 1990, Vol. 211, pages 943-945, especially page 944.	7-9

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

30 December 2002 (30.12.2002)

Date of mailing of the international search report

30 JUN 2004

Name and mailing address of the ISA/US

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/19448

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.: 10-26 because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

  

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.